

Application No. 10/622,614
Amendment dated December 23, 2004
Reply to Office Action of July 26, 2004

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior versions and listings of claims in the application.

Listing of claims:

1. (Currently amended): A semiconductor device comprising:

a first insulating film formed over a substrate;

a first interconnection buried in at least a surface side of the first insulating film, the first interconnection having a pattern which is bent at a right angle;

a second insulating film formed on the first insulating film with the first interconnection buried in, and including a groove-shaped via-hole formed in a region above the first interconnection, the groove-shaped via-hole having a pattern which is formed along an extending direction of the first interconnection and is bent at a right angle ~~formed in a region above the first interconnection;~~ and

a first buried conductor filled in the groove-shaped via-hole.

2. (Withdrawn): A semiconductor device according to claim 1, wherein

a width at a bent portion of the pattern of the groove-shaped via-hole is not more than a width at a straight portion thereof.

3. (Withdrawn): A semiconductor device according to claim 1, wherein
the groove-shaped via-hole is bent at a bent portion of the pattern a plurality of times at a
larger angle than 90° .

4. (Withdrawn): A semiconductor device according to claim 3, wherein
the groove-shaped via-hole is bent at the bent portion of the pattern twice each at 135° .

5. (Withdrawn): A semiconductor device according to claim 3, wherein
a pattern of the first interconnection is bent in the same way as the pattern of the groove-
shaped via-hole.

6. (Withdrawn): A semiconductor device according to claim 4, wherein
a pattern of the first interconnection is bent in the same way as the pattern of the groove-
shaped via-hole.

7. (Withdrawn): A semiconductor device comprising:
a first insulating film formed over a substrate;
a first interconnection buried in at least a surface side of the first insulating film, the first
interconnection having a pattern which is bent at a right angle;

a second insulating film formed on the first insulating film with the first interconnection buried in, and including a groove-shaped via-hole formed in a region above the first interconnection; and

a first buried conductor filled in the groove-shaped via-hole,
the groove-shaped via-hole being interrupted at a corner of the pattern of the first interconnection.

8. (Original): A semiconductor device according to claim 1, further comprising:
a second buried conductor buried in a hole-shaped via-hole formed in the second insulating film on the first interconnection.

9. (Withdrawn): A semiconductor device according to claim 7, further comprising:
a second buried conductor buried in a hole-shaped via-hole formed in the second insulating film on the first interconnection.

10. (Original): A semiconductor device according to claim 8, wherein
a width of the groove-shaped via-hole is 20 - 140% of a width of the hole-shaped via-hole.

11. (Withdrawn): A semiconductor device according to claim 9, wherein

a width of the groove-shaped via-hole is 20 - 140% of a width of the hole-shaped via-hole.

12. (Original): A semiconductor device according to claim 8, wherein
a width of the groove-shaped via-hole is not more than a width of the hole-shaped via-hole.

13. (Withdrawn): A semiconductor device according to claim 9, wherein
a width of the groove-shaped via-hole is not more than a width of the hole-shaped via-hole.

14. (Withdrawn): A semiconductor device according to claim 1, including a plurality of groove-shaped via-holes arrange adjacent to each other formed in the second insulating film,
at least a part of the grooves being formed of the groove-shaped via-hole.

15. (Withdrawn): A semiconductor device according to claim 7, including a plurality of groove-shaped via-holes arrange adjacent to each other formed in the second insulating film,
at least a part of the grooves being formed of the groove-shaped via-hole.

16. (Withdrawn): A semiconductor device according to claim 14, wherein

the groove-shaped via-hole is formed at the outermost of the groove-shaped via pattern.

17. (Withdrawn): A semiconductor device according to claim 15, wherein
the groove-shaped via-hole is formed at the outermost of the groove-shaped via pattern.

18. (Withdrawn): A semiconductor device according to claim 14, wherein
the groove-shaped via pattern is formed on one and the same pattern of the first
interconnection.

19. (Withdrawn): A semiconductor device according to claim 15, wherein
the groove-shaped via pattern is formed on one and the same pattern of the first
interconnection.

20. (Original): A semiconductor device according to claim 1, wherein
the groove-shaped via-hole is formed along an extending direction of the first
interconnection.

21. (Withdrawn): A semiconductor device according to claim 7, wherein
the groove-shaped via-hole is formed along an extending direction of the first
interconnection.

22. (Currently amended): A semiconductor device ~~according to claim 1, wherein~~
comprising:

~~the first interconnection buried in the first insulating film is a conducting layer buried in~~
~~the a surface side of a substrate~~ the conducting layer having a pattern which is bent at a right
angle;

an insulating film formed on the substrate with the conducting layer buried in, and
including a groove-shaped via-hole formed in a region above the conducting layer, the via-hole
having a pattern which is formed along an extending direction of the conducting layer and is
bent at a right angle; and

a buried conductor filled in the groove-shaped via-hole.

23. (Withdrawn): A semiconductor device according to claim 7, wherein
the first interconnection buried in the first insulating film is a conducting layer buried in
the substrate.

24. (Original): A semiconductor device according to claim 1, wherein
the first interconnection is formed of a conductor which is mainly formed of copper.

25. (Withdrawn): A semiconductor device according to claim 7, wherein
the first interconnection is formed of a conductor which is mainly formed of copper.

26. (Original): A semiconductor device according to claim 1, further comprising:

a second interconnection formed on the second insulating film and formed of a conductor which is mainly formed of aluminum.

27. (Withdrawn): A semiconductor device according to claim 7, further comprising:

a second interconnection formed on the second insulating film and formed of a conductor which is mainly formed of aluminum.

28. (Original): A semiconductor device according to claim 26, wherein

the first interconnection and the second interconnection have the same pattern.

29. (Withdrawn): A semiconductor device according to claim 27, wherein

the first interconnection and the second interconnection have the same pattern.

30. (Withdrawn): A semiconductor device comprising:

a first and a second impurity diffused regions formed in a semiconductor substrate;

a first insulating film formed on the semiconductor substrate, and including a groove-shaped via-hole having a pattern bent at a right angle formed in a region above the first impurity

diffused region and a hole-shaped via-hole formed in a region above the second impurity diffused region;

a first buried conductor buried in the groove-shaped via-hole; and
a second buried conductor buried in the hole-shaped via-hole,
a width of the groove-shaped via-hole being 20 - 140% of a width of the hole-shaped via-hole.

31. (Original): A semiconductor device according to claim 1, wherein
the first buried conductor and the second buried conductor are formed of a conductor
mainly formed of tungsten.

32. (Withdrawn): A semiconductor device according to claim 7, wherein
the first buried conductor and the second buried conductor are formed of a conductor
mainly formed of tungsten.

33. (Withdrawn): A semiconductor device according to claim 30, wherein
the first buried conductor and the second buried conductor are formed of a conductor
mainly formed of tungsten.

34. (Currently amended): A semiconductor device according to claim 1, wherein

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the second insulating film is a layer film of a silicon nitride film and a silicon oxide film
~~or a layer film of an SiC film and a silicon oxide film.~~

35. (Withdrawn): A semiconductor device according to claim 7, wherein
the second insulating film is a layer film of a silicon nitride film and a silicon oxide film
or a layer film of an SiC film and a silicon oxide film.

36. (Withdrawn): A semiconductor device according to claim 30, wherein
the second insulating film is a layer film of a silicon nitride film and a silicon oxide film
or a layer film of an SiC film and a silicon oxide film.

37. (Currently amended): A semiconductor device according to claim 1, wherein
the first insulating film is a layer film of a silicon nitride film and a silicon oxide film ~~or a~~
~~layer film of an SiC film and an SiOC film.~~

38. (Withdrawn): A semiconductor device according to claim 7, wherein
the first insulating film is a layer film of a silicon nitride film and a silicon oxide film or a
layer film of an SiC film and an SiOC film.

39. (Withdrawn): A semiconductor device according to claim 30, wherein

the first insulating film is a layer film of a silicon nitride film and a silicon oxide film or a layer film of an SiC film and an SiOC film.

40. (Withdrawn): A method for fabricating a semiconductor device including a first insulating film formed over a substrate, a first interconnection buried in at least a surface side of the first insulating film, and a second insulating film formed on the first insulating film with the first interconnection buried in and including a groove-shaped via-hole and a hole-shaped via-hole which are opened on the first interconnection,

in forming the groove-shaped via-hole and the hole-shaped via-hole in the second insulating film, a mask pattern having a design width of the groove-shaped via-hole smaller than a design width of the hole-shaped via-hole being used to form the groove-shaped via-hole and the hole-shaped via-hole.

41. (Withdrawn): A method for fabricating a semiconductor device including a first insulating film formed over a substrate, a first interconnection buried in at least the surface side of the first insulating film, a second insulating film formed on the first insulating film with the first interconnection buried in and including a groove-shaped via-hole and a hole-shaped via-hole which are opened on the first interconnection, and a buried conductor buried in the groove-shaped via-hole and the hole-shaped via-hole,

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in forming the buried conductor, a deposited film thickness of a conducting film to be the buried conductor being set in consideration of a maximum width of the groove-shaped via-hole, so that the groove-shaped via-hole and the hole-shaped via-hole are filled by the buried conductor.

42. (New) A semiconductor device according to claim 1, wherein the second insulating film is a layer film of an SiC film and a silicon oxide film.

43. (New) A semiconductor device according to claim 1, wherein the first insulating film is a layer film of an SiC film and an SiOC film.

44. (New) A semiconductor device according to claim 1, wherein the first buried conductor completely fills the groove-shaped via-hole without any voids.